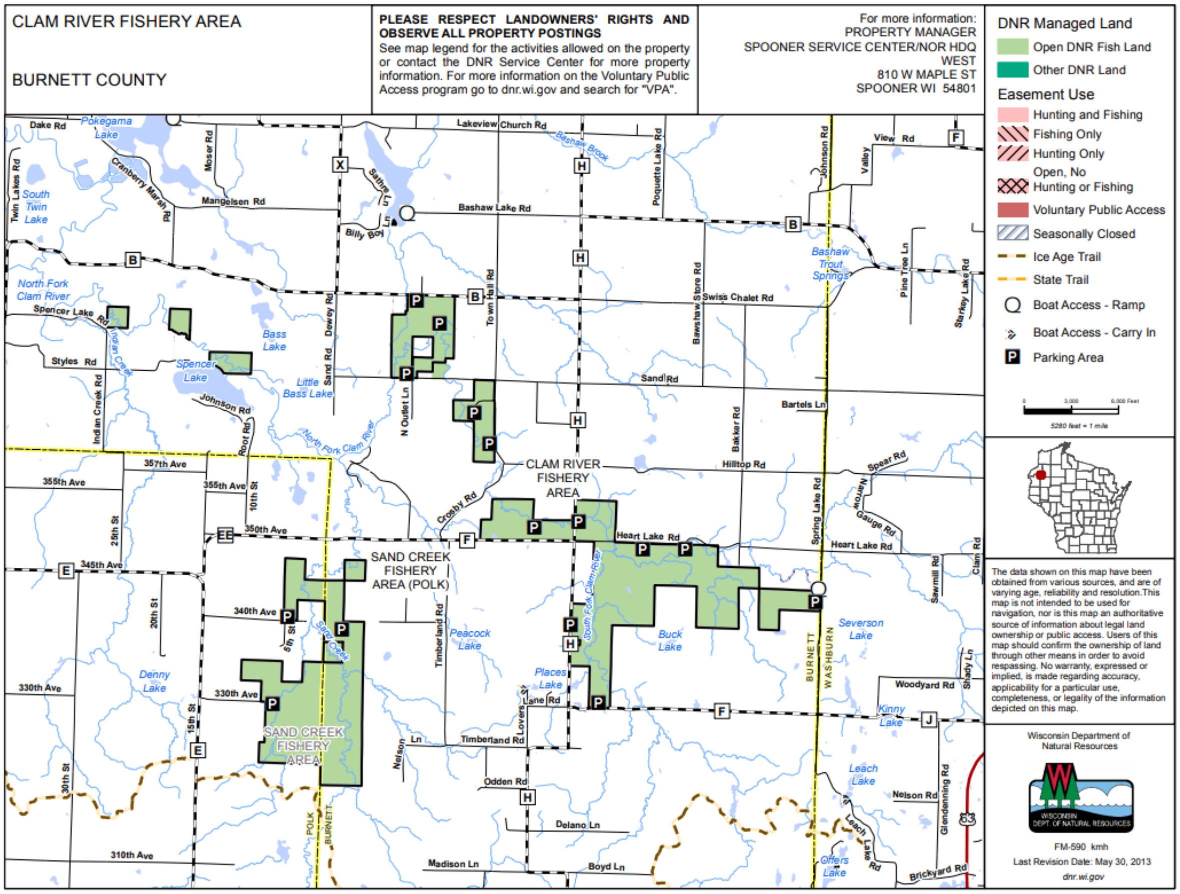
Upper Clam River Watershed Trout Assessment, Burnett and Polk County, 2018



Craig Roberts

Senior Fisheries Biologist

Wisconsin Department of Natural Resources

North District – Spooner

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Executive Summary

An assessment of the Upper Clam River Watershed occurred in 2018 in the North Fork of the Clam River, Sand Creek, and Spring brook in Burnett and Polk Counties. The primary objective of this study was to evaluate UCRW trout populations in the North Fork of the Clam River, Sand Creek, and Spring Brook. Secondary objectives were to evaluate the effects of the more liberal size limit in the UCRW within these streams.

A total of 10 sites were sampled in the North Fork of the Clam River from the headwaters to farthest downstream bridge at Sand Rd in 2018. Two sites in Washburn County were considered exploratory looking for presence or absence of trout. These sites combined covered roughly 1.5 miles of stream within the North Fork of the Clam River. There was a total of 1,404 brown trout and 158 brook trout sampled (9 brown trout: 1 brook trout) in 2018. Across all sites, brook trout averaged 6.1 inches (in) and brown trout averaged 6.8 in. Abundances of brook trout and brown trout varied by site.

One site was sampled within Sand Creek and Spring brook in 2018. This data was compared with yearly trend data for each stream. Brown trout are highly abundant in Sand Creek (CPE range: 379 – 1929 fish/mile). While Spring brook is mostly a brook trout stream (CPE range: 39 – 613) with brown trout abundance oscillating through time (CPE range: 16 – 452). Brown trout are abundant at most sites, while brook trout are declining at some sites.

Management recommendations: 1) Continue yearly sampling at all trend sites. 2) Install temperature loggers at several sites near trend sites. 3) Use survey data to inform/direct new trout habitat work. 4) Consider more restrictive regulation for brook trout if populations decline. 5) No regulation changes are needed for brown trout. 6) Land acquisition in an important management action for fisheries in this area. 7) Look at fish passage barriers and evaluate for improvements. 8) Monitor beaver activity and eliminate in trout streams in this area.

Introduction

Upper Clam River and its tributaries (UCRW) are popular trout streams in Southeast Burnett and Northeast Polk Counties. Primary trout streams include the North Fork and South Fork of the Clam River, Sand Creek, and Spring Brook (figure 1). A majority of these streams are accessible via the Clam River Fishery Area and Sand Creek Fishery Area (see title page image). Brown trout *Salmo trutta*, are found throughout the classified trout water (which ends at confluence with the main stem Clam River). Brook trout *Salvelinus fontinalis* are more common in upper reaches of UCRW (Wendel 2012).

The UCRW in Burnett County is the largest trout system in the Clam River watershed. The primary tributaries are the North Fork and South Fork of the Clam River. A majority of the watershed is forested with a small amount of hay/cultivated agriculture. Riparian land is comprised of mix of public/private property. Sand Creek is a moderate sized tributary to the North Fork of the Clam River located on the Burnett/Polk County line. Sand Creek's watershed is also forested with a small amount of agriculture. Spring brook is a small, third order trout stream in Southeast Burnett County. A majority of the riparian area is forested with Sand Creek and Spring brook (Wendel 2012).

Since 1998, the only documented fish stocking that occurred in the UCRW has been on the North Fork of the Clam River. Between 1973 and 2011, a total of 14,132 brown trout yearlings have been stocked in the North Fork of the Clam River. Most of these stockings occurred in lower portions where water temperatures are warmer (Class 2 and 3 trout water).

UCRW trout streams are currently managed with a no minimum size limit and five bag limit. This regulation took effect in 2016. Prior to 2016, UCRW was managed with a special trout regulation since 2003. This regulation was a maximum size limit of 12 in with a bag limit

of five fish. Prior to 2003, the regulation was a 7 in minimum size limit and three fish bag limit except on Spring Brook, where there was no minimum size limit and a 10-fish bag limit.

The primary objective of this study was to evaluate UCRW trout populations in the North Fork of the Clam River, Sand Creek, and Spring Brook. Secondary objectives were to evaluate the effects of the more liberal size limit in the UCRW within these streams.

Methods

Sampling was conducted following Wisconsin Department of Natural Resources cold water streams monitoring protocol (WDNR 2007). Lengths of stations were 35 times mean stream widths with a minimum sampling distance of 100 meters. DC backpack or stream shockers were used to sample stations. Trout were collected throughout each station and measured to the nearest 0.1 in. Trout were counted in sites where we measured over 200 trout and were concerned with fish mortality (WDNR 2007).

Catch per Unit Effort (CPE) was calculated as the number of fish per mile of stream sampled (i.e. – fish/mile). Young-of-year (YOY) trout were removed from CPE and average length for every stream except Springbrook to remove bias. YOY trout were considered fish under 4.0 inches (based on length frequency) or were counted as YOY. Size structure quality of species sampled was determined by using the indices of proportional stock densities (PSD) (Neumann et al. 2013). The PSD value for a species is the number of fish of a specified length and longer divided by the number of fish of stock length or longer, the result multiplied by 100. PSD was assessed yearly for Sand Creek (which had a good sample size each year). Rockaway Lane was evaluated based on changes in species diversity.

Results

North Fork of the Clam River

A total of 10 sites were sampled in the North Fork of the Clam River from the headwaters to farthest downstream bridge at Sand Rd in 2018 (Figure 1). Two sites in Washburn County were considered exploratory looking for presence or absence of trout. These sites combined covered roughly 1.5 miles of stream within the North Fork of the Clam River. There was a total of 1,404 brown trout and 158 brook trout sampled (9 brown trout: 1 brook trout) in 2018. In sites upstream of County Highway H (CTH), there were fewer brown trout collected (40% of 1404) and more brook trout (94% of 158). The brown trout: brook trout ratio was also lower upstream of CTH, approximately 4:1 (compared to 1 brown trout: 1 brook trout in 2012). Across all sites, brook trout averaged 6.1 in (SD =1.3) and brown trout averaged 6.8 in (SD =2.1). This was a decrease for both species since from 2012 (brook avg – 6.5 in; brown avg – 7.6 in) (Figure 2 & 3).

Heart Lake Rd bridge trend site

At the Heart Lake Rd bridge trend site (upstream of CTH, labeled UHB in figure 1), brook trout (CPE range: 11 – 422 fish/mile) were less abundant than brown trout (CPE range: 222 – 844 fish/mile) (Figure 4). Average size has not shown any significant trends with brown or brook trout (Table 1). Recruitment was variable for brook trout and brown trout (Figure 5). However, there seems to be a gradual increase in YOY (young-of-year) brown trout and gradual decrease in YOY brook trout (Figure 5).

Sand Rd -east bridge trend site

At the Sand Rd- east bridge trend site (downstream of CTH, labeled USR in Figure 1), brook trout are relatively rare (CPE range: 0 – 42 fish/mile) compared to abundant brown trout

(779 – 1,915 fish/mile). Brown trout have generally been increasing at this site since 2015 (Figure 6). Brown trout average size has also been stable since 2015 (Table 2). Brook trout recruitment has been consistently low at this site, while brown trout YOY CPE has been on an increase since 2011 (Figure 7).

Rockaway Lane Evaluation.

At Rockaway Lane (labeled RLN in Figure 1), a pre-survey was conducted in 2011 (prior to trout habitat enhancement work). The survey yielded 173 brown trout (514.3 fish/mile without YOY) with an average length of 6.9 in (SD = 2.2). There were also seven brook trout (25 fish/mile) collected with an average length of 6.9 in (SD = 1.4). In 2018, 364 brown trout (996 fish/mile without YOY) were collected with an average length of 6.5 in (SD = 1.7). No brook trout were collected in 2018. PSD for 2018 brown trout was 18, compared to 21 in 2011. Species diversity also decreased at the site between 2011 and 2018 (Table 3).

Sand Creek

Brown trout are highly abundant in Sand Creek (CPE range: 379 – 1929 fish/mile). There is a negative trend with abundance since 2007 (Figure 6). Average size of brown trout (without YOY) present has remained steady since 2007, ranging from 6.1 to 7.6 in (table 4). PSD is poor ranging from 11 – 41 and averaging 29 over the past 11 years (Table 4). Brown trout recruitment has been variable since 2007 (Figure 8).

Spring Brook

This stream is mostly a brook trout stream (CPE range: 39 – 613) with brown trout abundance oscillating through time (CPE range: 16 – 452). Brook trout abundance has

generally been greater than brown trout since 2011 (Figure 9). Brook trout average length has been gradually increasing until 2018, while this is no noticeable trend with brown trout (Table 5). Recruitment was variable for brook and brown trout with no positive/negative clear trends (Figure 10).

Discussion

The UCRW and its tributaries provide some of the best stream trout fishing in Burnett County. Brook trout and brown trout remain the species that most anglers pursue in these streams. Trout populations remain abundant depending on one's location in the UCRW. Below I will discuss: 1) trends with brook trout abundance in UCRW. 2) trends with brown trout abundance in UCRW. 3) effects of Rockaway Ln trout habitat work 4) other trends related to fishing regulations, water temperature, and recruitment.

Brook trout abundances declined since 2012 (the last major survey effort) in the North Fork of the Clam River. This conclusion is mostly referring to sites upstream of CTH, where brook trout abundance has typically been higher. It is difficult to conclude what is causing this downward trend. This trend could be related to changing water conditions (temperature, nutrients), increased angler harvest, or interspecific competition with brown trout. In Springbrook, which is a tributary to the UCRW, brook trout abundances have generally increased since 2011. This trend has occurred even with gill lice present in the population (Mitro 2016). Sand creek has generally had very few brook trout present and has not likely had a fishable population since the establishment of brown trout.

Brown trout remain highly abundant in the whole UCRW in Burnett and Polk Counties. Their abundances have increased at both sites within the North Fork of the Clam River through time. Sand creek has seen both increasing and decreasing trends since 2007. The past three

years have seen an increasing trend; this is likely a population response to the hard winter of 2013-14. Springbrook is the only stream we sampled where brown trout abundance is lower and has generally decreased since 2011.

Rockaway Ln underwent a trout habitat improvement project in 2012. This project was intended to improve brook trout and brown trout size structure by increasing adult trout habitat. This work included adding cover structures, boulder clusters, sediment removal, riprap for bank stabilization, root wad/boulder revetments, and plunge pools. After comparing size structure data from 2011 to this season it appears that the habitat work did increase numbers of adult brown trout at site. Brown trout CPE almost doubled in 2018 compared to 2011. However, average size of brown trout did not change greatly. Harvest of trout would likely be better method of increasing average size than habitat work in this area. One apparent negative impact of the trout habitat work was decreased species diversity. Six species were not present, including brook trout, that were present during the 2011 survey. This change could also be due to increased brown trout numbers or increasing water temperatures.

The more liberal regulation that was enacted in the UCRW in 2016 doesn't seem to have caused any major population changes. Both brown and brook trout size structure was very similar between the two years with different regulations in effect. When looking at individual trend sites, there also seemed to be little changes that can be pointed at harvest as a large contributing factor for the system. It appears that the UCRW receives little angling pressure based on our survey data.

Some other factors that may be impacting the changes in trout populations are: changes in riparian land use, groundwater usage, and brown trout recruitment. Riparian land use is something DNR largely cannot control nor directly attribute to changes in the trout population.

The indirect effects of poor land practices may warm waters by increasing overland water flow into the North Fork and South Fork of the Clam River. However, DNR has not monitored these areas with temperature loggers through time. Another issue may be changes to the in-stream habitat are favoring high levels of brown trout recruitment. All our trend sites in UCRW, except Springbrook, have strong levels of YOY brown trout. These are variables that can greatly influence the trout population, but we have a data need before making any management decisions.

Management Recommendations

1. Continue to monitor the four trend sites within the UCRW: Heart Lake Rd Bridge – North Fork Clam River, Sand Rd East Bridge – North Fork Clam River, Sand Creek, and Springbrook.
2. Install HOBO temperatures loggers at several sites within the UCRW to learn more about water temperature dynamics that may be impacting trout populations.
3. Use recently collected habitat data to inform and direct future trout habitat work in UCRW and Clam River Fishery Area. This habitat work should be focused in areas that potentially benefit brook trout over brown trout.
4. If brook trout abundance begins to decline based on survey data, consider a more restrictive regulation/bag limit to protect their populations in the UCRW.
5. Brown trout are abundant and the current regulation encourages harvest to promote a better average size.
6. Land acquisition is an important management action for fisheries in the UCRW. Land acquisition provides greater access for anglers, protects important groundwater sources, and provides greater stream bank protection and enhancement.

7. Possible fish passage barriers should continue to be evaluated and considered for improvement. Brown trout have been found to make seasonal movements of 4.5-12.5 miles in northern Wisconsin streams (Meyers et al. 1992). Elimination of barriers allows these types of seasonal migrations and provides diverse habitat opportunities for trout.
8. Monitoring of beaver *Castor canadensis* activity and elimination of beaver dams should continue in the UCRW.

Acknowledgements

I would like to thank Kent Bass, Josh Kucko, Misty Rood, and many others who conducted field work and entered data during this survey. Craig Roesler, DNR streams biologist-Spooner provided the additional data for their trend site at Sand Rd. Michael Vogelsang provided a critical review of the manuscript.

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Table 1. – Average size (in) for brown and brook trout sampled at North Fork Clam River – Heart Lake Rd bridge site. The double line represents the season where regulation changed from 12 in maximum to no minimum. Bold numbers mean there were less than three fish in the sample.

	brook	brown
2011	**9.4**	8.9
2012	6.7	9.4
2013	7.8	9.8
2014	7.8	7.8
2015	6.9	9.4
2016	7.2	9.8
2017	6.4	9.3
2018	7.1	6.7

Table 2. - Average size (in) for brown and brook trout sampled at North Fork Clam River – Sand Rd east bridge. The double line represents the fishing season where regulation changed from 12 in maximum to no minimum. Bold numbers mean there were less than three fish in the sample.

	brook	brown
2011	**5.4**	7.3
2012	-	7.9
2013	8.0	8.7
2014	**8.1**	7.6
2015	**8.4**	8.7
2016	7.9	7.1
2017	7.9	8.2
2018	-	6.6

Table 3. – Species present (marked by x) for sampling at North Fork Clam River-Rockaway Ln in 2011 and 2018.

Fish Species	2011	2018
Brook Trout	x	
Brown Trout	x	x
White Sucker	x	x
Northern Hog Sucker	x	
common shiner	x	
hornyhead chub	x	
western blacknose dace	x	x
mottled sculpin	x	x
longnose dace	x	x
creek chub	x	x
Logperch	x	x
chesnut lamprey/ammocetes	x	x
johnny darter	x	
black bullhead	x	

Table 4. – Average size (in) and PSD for brown trout collected in Sand Creek, Burnett/Polk County, WI. The double line represents the fishing season where regulation changed from 12 in maximum to no minimum.

	Average size (in)	PSD
2007	7.6	41
2008	7.1	35
2009	6.3	22
2010	6.1	18
2011	6.2	30
2012	7.3	31
2013	7.1	40
2014	6.6	25
2015	7.5	11
2016	6.5	27
2017	7.6	36
2018	6.6	28

Table 5. – Average size (in) for brook trout and brown trout for Springbrook, Burnett County, WI (with YOY). Bold numbers mean less than three fish for an average.

	brook	brown
2008	4.9	4.8
2009	7.7	6.6
2010	-	-
2011	4.7	3.7
2012	3.6	6.5
2013	5.1	**10.2**
2014	4.6	3.9
2015	4.7	4.3
2016	5.5	3.4
2017	6.1	5.0
2018	5.0	8.0

Figure 1. – Sampling locations on the North Fork Clam River (MEC – most east crossing Heart Lake Rd, SLR-near Spring Lake Rd, DBR- Downstream of Bakker Rd, HLE – near Hear Lake Rd East Parking Lot, UHB – Upstream of Heart Lake Rd Bridge, CTH – near County Highway H, NEE – Near EE parking lot, RLN – Rockaway Ln, USR –Sand Rd east bridge, SR – Sand Rd west bridge), Spring brook (SB), and Sand Creek (SC). Green shading denotes public land within Clam River Fishery Area and Sand Creek Fishery Area.

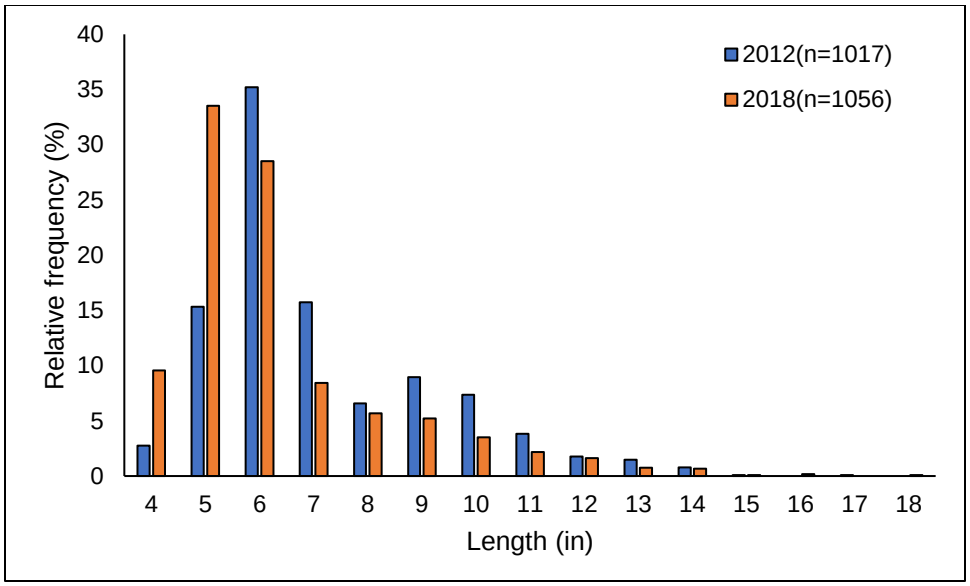

Figure 2. – Relative frequency of brown trout captured at eight sites in 2011-12 and 2018 for North Fork Clam River, Burnett County, WI.

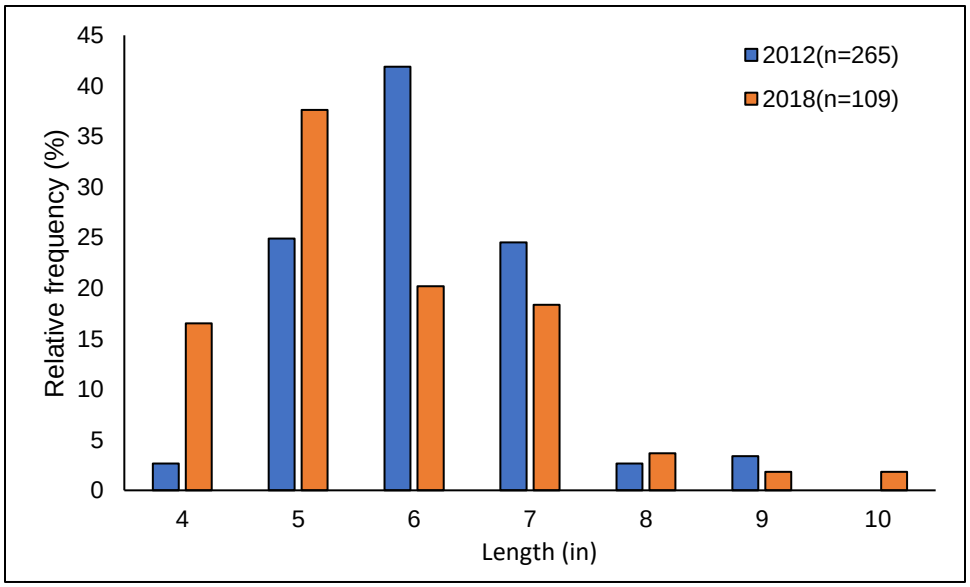

Figure 3. - Relative frequency of brook trout captured at eight sites in 2011-12 and 2018 for North Fork Clam River, Burnett County, WI.

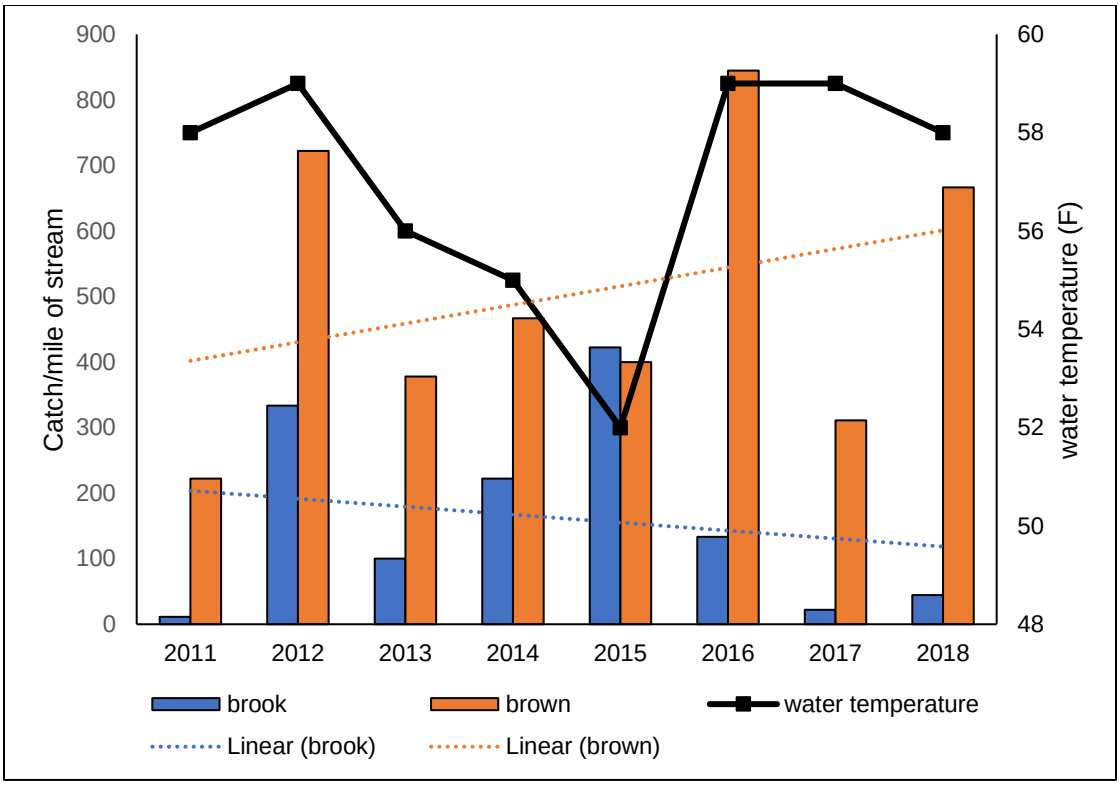

Figure 4. – Catch/mile of stream (without YOY) for brown trout, brook trout, and water temperature (F) for North Fork Clam River – Heart Lake Rd Bridge site, Burnett County, WI.

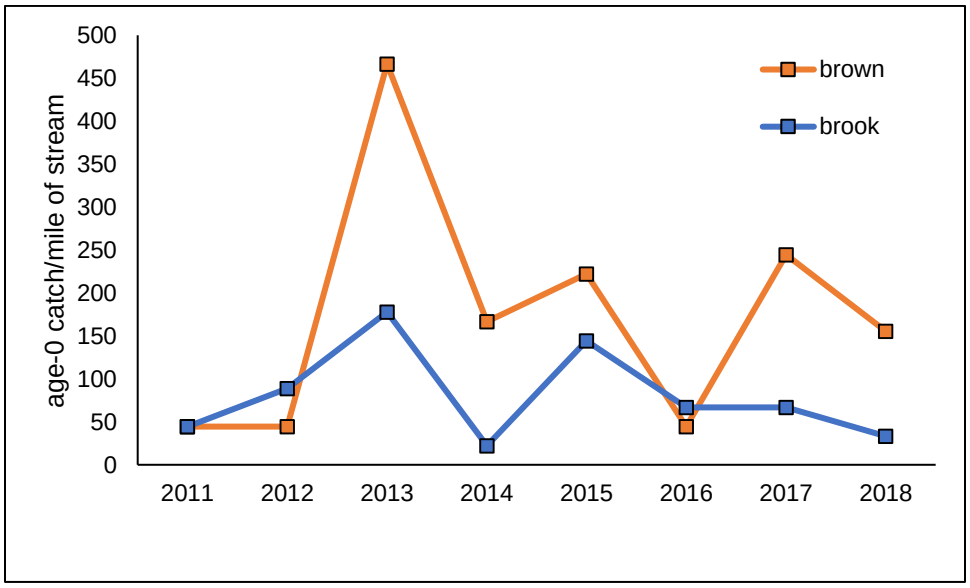

Figure 5. – Age-0 catch/mile for brown and brook trout at North Fork Clam River – Heart Lake Rd Bridge site, Burnett county WI.

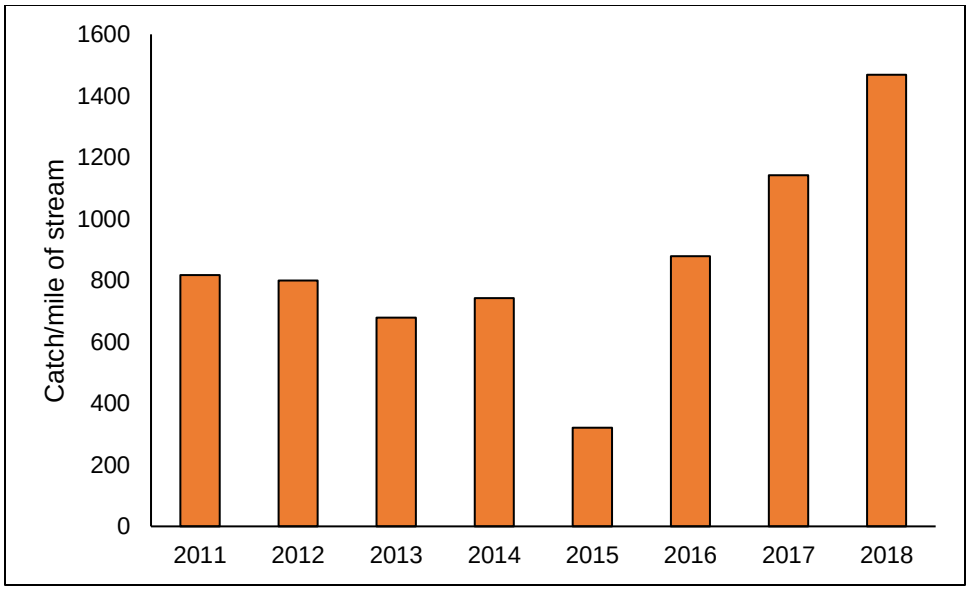

Figure 6. – Catch/mile of stream (without YOY) for brown trout for North Fork Clam River – Sand Rd east bridge, Burnett County, WI.

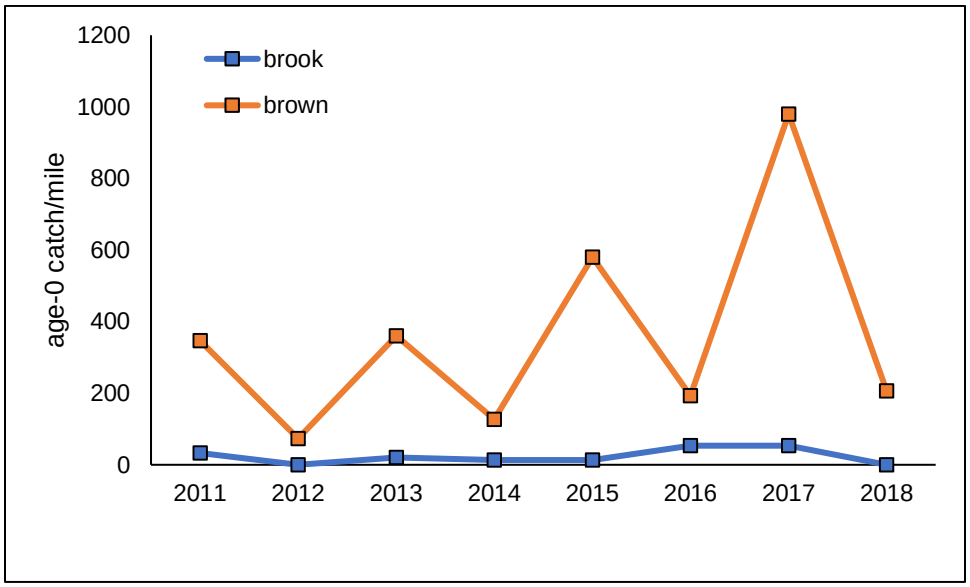

Figure 7. – Age-0 catch/mile of stream for brown trout and brook trout for North Fork of Clam River – Sand Rd east bridge, Burnett County, WI.

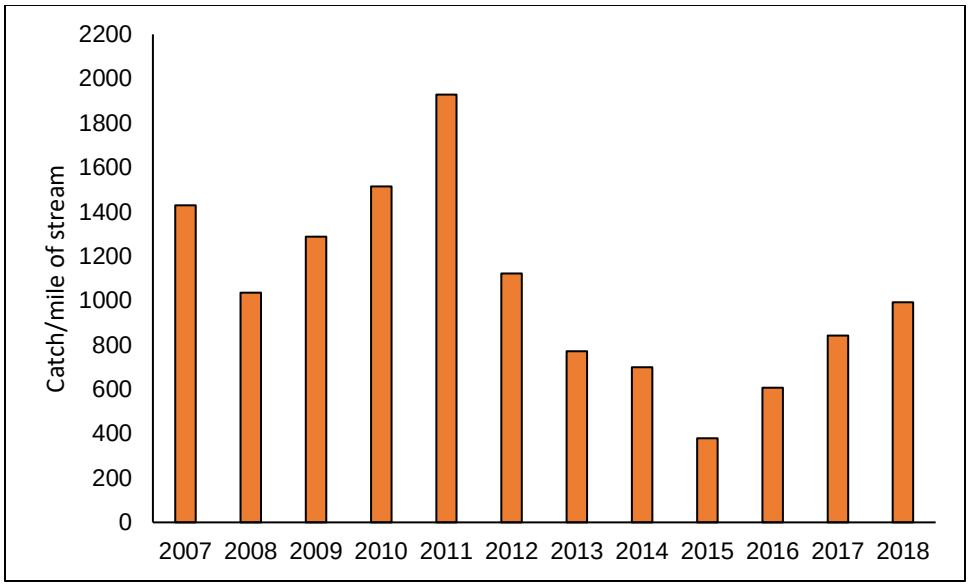

Figure 8. - Catch/mile of stream (without YOY) for brown trout for Sand Creek, Burnett/Polk County, WI.

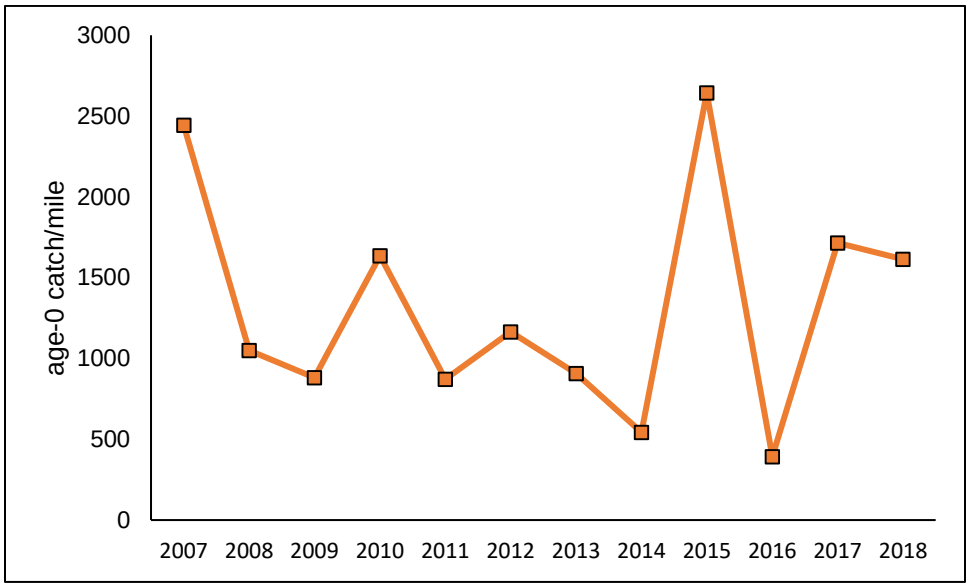

Figure 9. – Age-0 catch/mile of stream for brown trout for Sand Creek, Burnett/Polk County, WI.

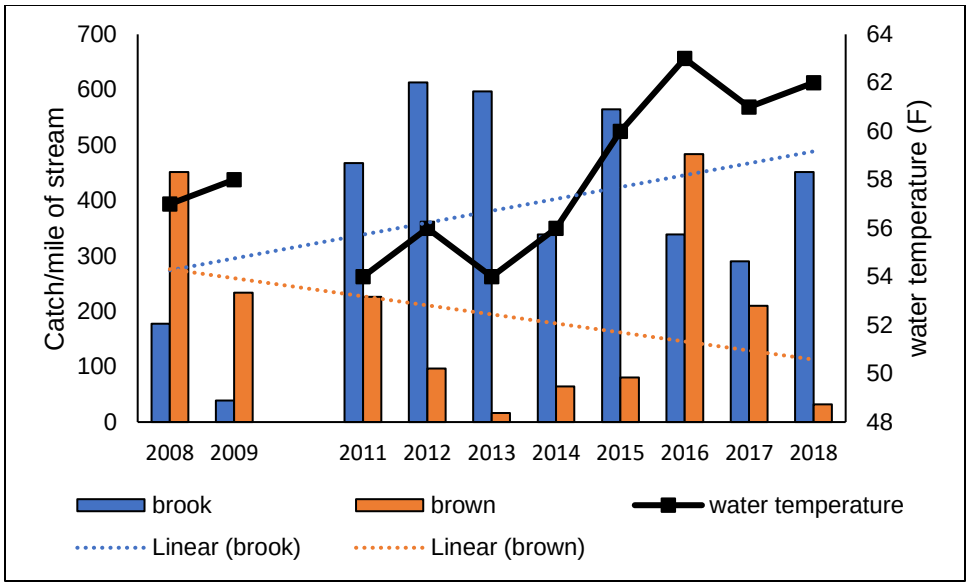

Figure 10. – Catch/mile of stream (with YOY for sample size) for brook trout and brown trout for Springbrook, Burnett County, WI.

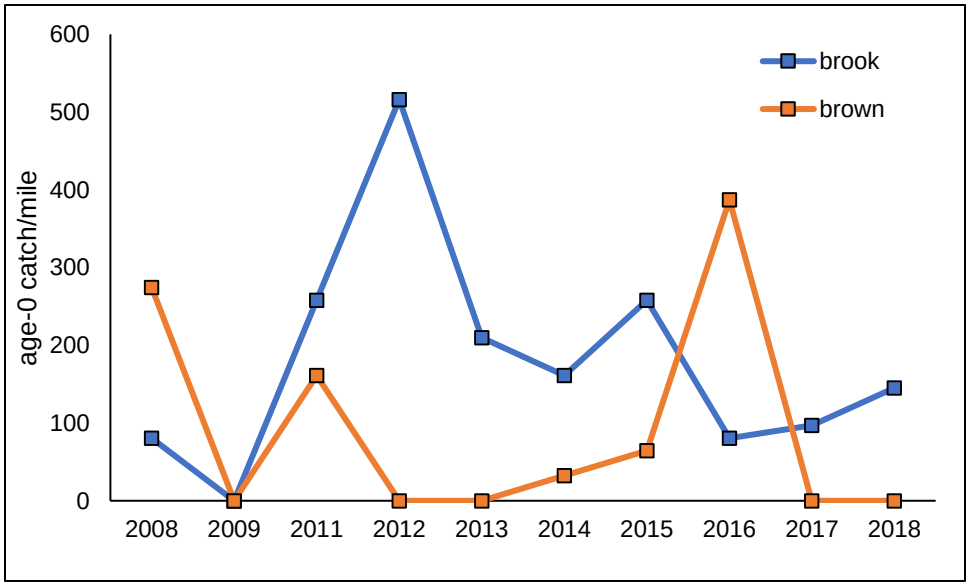

Figure 11. – Age-0 catch/mile of stream for brook trout and brown trout for Springbrook, Burnett County, WI.